

it reaches the vessels of the upper extremities and head. These rather far-fetched theories have not been substantiated by others. ALWENS and FRICK (*Frank. Ztschr. f. Path.*, 1914, xv, 315) carried out animal experiments in which they injected bismuth suspensions into the ear or femoral veins. The lungs were examined during life and after death with the Roentgen-ray. By this means they were able to observe the course of the injected materials quite accurately. Besides this, histological examination of the specimens was also undertaken. They were unable to agree with the Kretz findings and could offer no evidence that the blood from the upper and lower portions of the body remained in separate streams. In the living animal they could observe that the blood in the ventricles was fully mixed. They found, however, that the injection of larger quantities of foreign material led to the localization of much of it in the lower lobes of the lung. This localization occurred in this tissue regardless whether it was introduced into the jugular or femoral veins.

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**Variability of Pathogenic Bacteria.**—Bacteriologists have long been interested in the variations developing among pathogenic bacteria. BERNHARDT (*Ztschr. f. Hyg. u. Infektionskrankh.*, 1914, lxxix, 179) has contributed to the subject some important results. He worked chiefly with strains of *B. typhosus*, and the diphtheria group but also records observations on *B. paratyphosus*, meningococcus, the bacillus of fowl cholera and the bacillus of rabbit septicemia. The alterations he obtained with the *B. typhosus* were marked changes in the types of colonies, cultural differences in broth, variations in agglutination, and loss of motility. In his series of experiments he was able to trace all degrees of variations from the original strains to the extreme variants. He also found marked differences in the permanency of these variations. One variant of *B. typhosus* lost its motility and remained non-motile during the period of observation, one and a quarter years, even after animal passage or frequent transfers. He was unable to find any fundamental differences in agglutination or antigen powers in the altered strains. Most of his variants were obtained from broth cultures at different periods of growth and he found that variants tended to disappear and that types closely resembling the original remained in the older cultures. Among the members of the diphtheria group the principal changes obtained were in morphology, colony formation and toxin production. All gradations in variation were noted. These alterations were mostly from broth, Loeffler's serum and agar, but he also obtained alterations by animal passage. The author believes that the changes obtained upon media also take place in man and supports his view by the finding of atypical forms in the nasal cavity and the urine of diphtheria patients. In two cases, both fatal, he grew true diphtheria bacilli from the urine. Some of his alterations were accompanied by lowered resistance and in others by increased viability. The latter was especially observed in the altered types of the bacillus of rabbit septicemia and meningococcus. The author discusses very fully the theoretical and practical significance of his findings and those of others. He believes that the source of these alterations is to be found chiefly in the metabolic products of the bacteria and that different bacteria react differently to the various stimuli. Moreover, he does not

agree with the view that the bacteria are predisposed by these means and that sudden changes take place. It is a gradual alteration. He also shows that the variations are not necessarily of any benefit to the bacteria but take place irregularly and almost by chance. An attempt is made to correlate these findings with the general problem of heredity and he discusses the use of such terms as mutation, modification and variety and points out that they can only be used in a relative sense.

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**The Widespread Distribution of Diphtheroids and Their Occurrence in Various Lesions of Human Tissues.**—Considerable confusion has been brought to the minds of many investigators by the finding of diphtheroid organisms in a great variety of human tissues. At times, an important relation is suggested between the organism and the diseased tissue; as in Hodgkin's disease and leprosy. Much difficulty is also experienced in designating the limits of the group. In one direction they advance closely to the true diphtheria bacillus, while in the other, transition forms closely approach the streptothrix group. HANNUSS and WADE (*Jour. Exper. Med.*, 1915, xxi, 493) have pointed out the wide distribution of this group of organisms in the human body. Under normal conditions it has been shown to be present in the eye, brain and cerebrospinal fluid and blood cultures. The authors have obtained them from lymph glands in simple hyperplasia while others have laid much stress upon the importance of finding the diphtheroids in the lymphatic system. Moreover, similar organisms were obtained from benign and malignant tumors of various kinds, but in no instance could any etiological importance be laid to them. Diphtheroid forms are also not uncommon upon the skin and in the air. The various diphtheroid organisms which have been isolated may to a certain extent be differentiated but up to the present no accurate procedure has been developed, whereby a suitable classification may be employed.

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**On the Mechanism of Pneumococcus Immunity.**—BOEDNCKE and MOURIZ-RIESGO (*Ztschr. f. Hyg. u. Infektionskrankh.*, 1915, lxxix, 355) believe that the promotion of phagocytosis is a more important function of pneumococcus sera than the antitoxic activity. From the experiments these authors, along with other investigators, have shown that pneumococcus sera possess a very definite antitoxic principle but that the animals are not cured by its use. The time of death is, however, definitely delayed. These sera promote phagocytosis and by this means exhibit their most important function in curing cases of pneumococcus infection.

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